

CLAIMS:

The invention claimed is:

1. A method of separating objects comprising:
 - (a) placing the objects in a separation channel;
 - 5 (b) rotating the channel to produce a centrifugal force on the objects;
 - (c) creating an electric field which varies along the channel; and,
 - (d) allowing the objects to migrate and separate along the channel under the combined influences of the centrifugal force and the electric field.
2. The method as claimed in Claim 1 in which the objects are biomolecules.
- 10 3. The method as claimed in Claim 2 in which the objects are proteins.
4. The method as claimed in Claim 2 in which the objects are either DNA or RNA fragments.
5. The method as claimed in Claim 1 in which the objects are biological cells.
6. The method as claimed in Claim 1 in which the objects are either gas or vapor molecules.
- 15 7. The method as claimed in Claim 1 in which the objects migrate to respective equilibrium points at which the centrifugal force is equal to an opposing force due to the electric field.
8. The method as claimed in Claim 1 further including controlling the migration of the objects by varying an angular velocity at which the channel is rotated.
- 20 9. The method as claimed in Claim 1 further including controlling the migration of the objects by controlling first and second voltages applied respectively at a first end of the channel and at a second end.
10. The method as claimed in Claim 8 in which the migration of the objects is controlled in order to move an object of interest to a collection point from which it may be collected for further study.
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11. The method as claimed in Claim 9 in which the migration of the objects is controlled in order to move an object of interest to a collection point from which it may be collected for further study.

12. A spectrometer rotor comprising:

- 5 (a) a radially-extending blade; and,
(b) field shaping means for shaping an electric field which, in use, varies along the blade,

whereby when the rotor is rotated about an axis, objects within the blade migrate and separate under the combined influence of the centrifugal force and the electric field.

10 13. The spectrometer rotor as claimed in Claim 12 in which the field shaping means includes a first electrode for applying a first voltage at a first end of the blade and a second electrode for applying a second voltage at a second radially-spaced end of the blade.

14. The spectrometer rotor as claimed in Claim 13 in which a side wall of the blade has a resistance which varies along the length of the blade.

15 15. The spectrometer rotor as claimed in Claim 13 in which the blade has a width which varies along its length.

16. The spectrometer rotor as claimed in Claim 15 in which the blade comprises a parallel-sided separation channel and a variable-width buffer region, the separation channel being arranged, in use, to receive the objects to be separated.

17. The spectrometer rotor as claimed in Claim 12 in which the blade is defined by a cavity within a disk-like rotor body.

18. The spectrometer rotor as claimed in Claim 12 including a collection point on the blade from which selected separated objects may be collected.

25 19. The spectrometer rotor as claimed in Claim 12 in which the field shaping means includes shaping electrodes within the blade.

20. The spectrometer rotor as claimed in Claim 12 in which the blade is arranged for receipt of objects for separation within a liquid or gaseous buffer.

21. The spectrometer rotor as claimed in Claim 12 in which the blade defines a vacuum cavity.

22. A spectrometer comprising a spectrometer rotor as claimed in Claim 12 in combination with a motor and motor control for controlling rotor angular velocity.

5 23. The spectrometer as claimed in Claim 22 further including means for generating and controlling the electric field.

24. The spectrometer as claimed in Claim 23 further including means for generating and controlling the electric field.

10 25. The spectrometer as claimed in Claim 13 further including a controller for simultaneously controlling both the rotor angular velocity and the electric field.

26. The spectrometer as claimed in Claim 24 further including means for applying user-defined voltages to both the first and the second electrodes.

27. The spectrometer as claimed in Claim 26 further including a controller for simultaneously controlling the first and second voltages and the rotor angular velocity.